

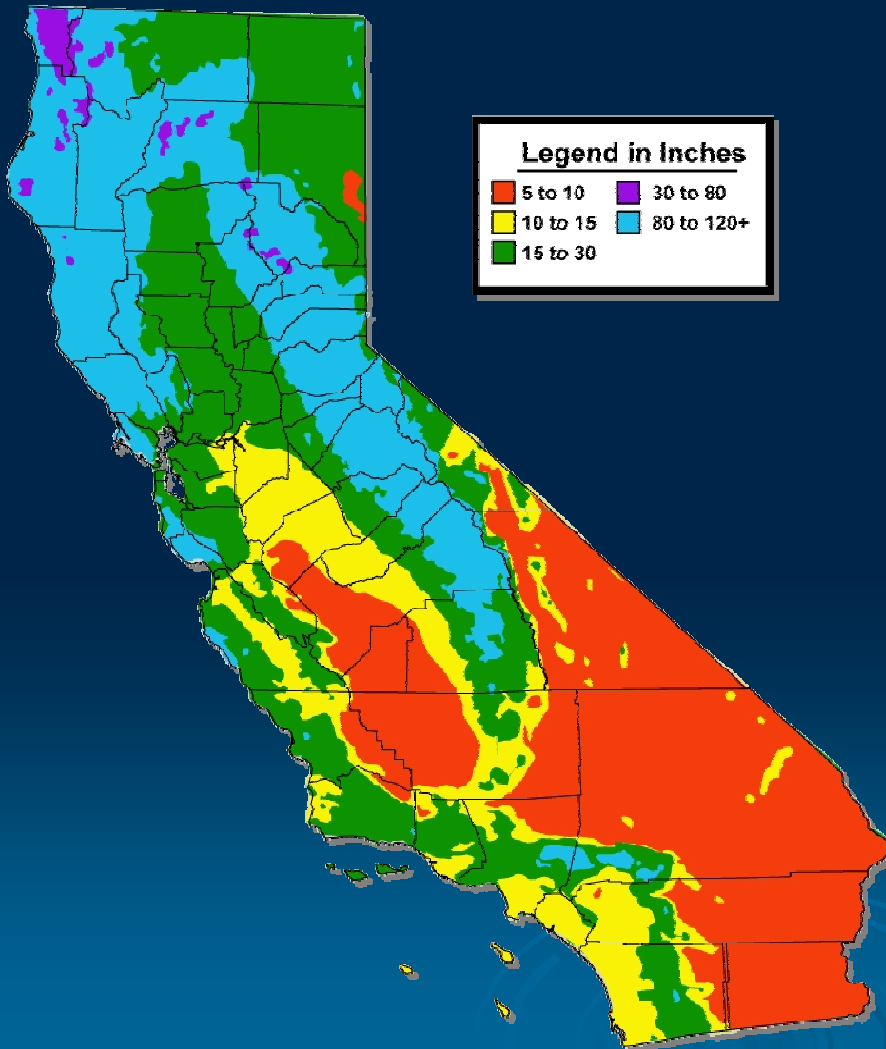
California Water Resources Variable & Extreme

February 23, 2009

Kamyar Guivetchi

**Statewide Integrated Water Management
California Department of Water Resources**

California Water Background



➤ Population

- 2008 -- 38 million
- 2030 -- 48 million
- 2050 -- 59 million

➤ Irrigated acreage

- 9.5 million

➤ Most precipitation occurs November thru March

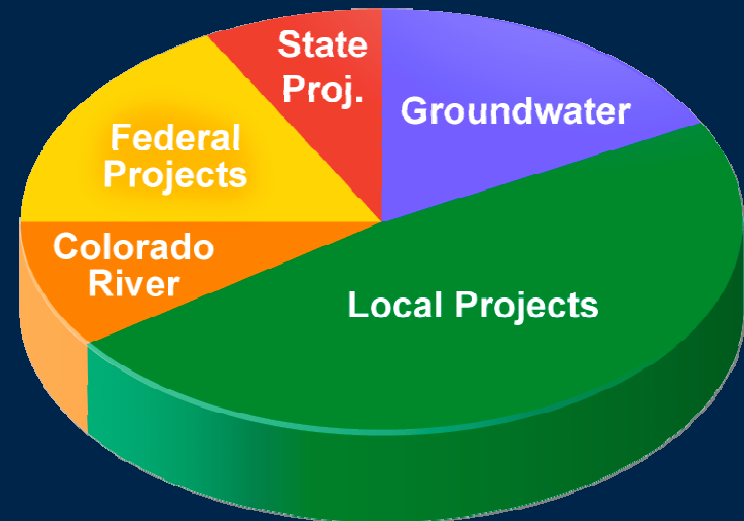
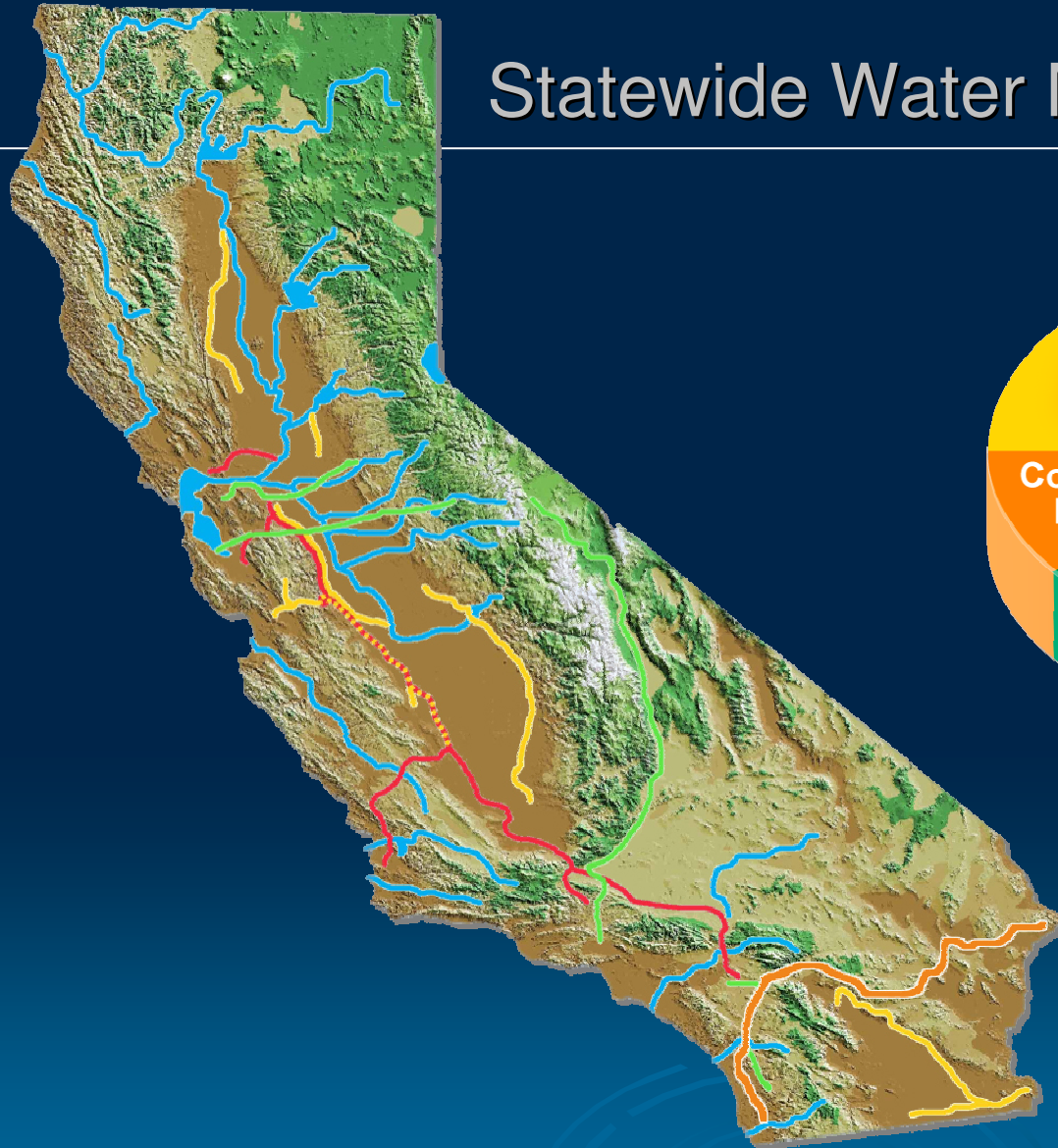
➤ 2/3 surface runoff occurs North of Sacramento

➤ 2/3 water use occurs South of Sacramento

California's Major River Systems

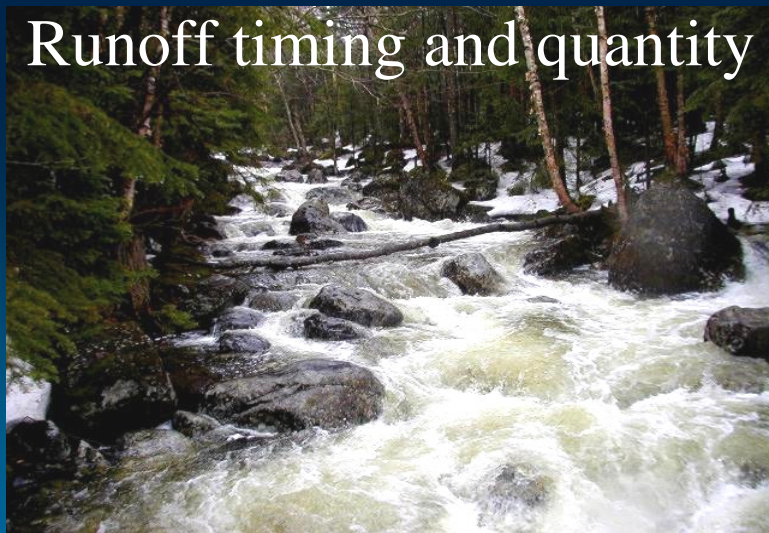


Statewide Water Management Systems

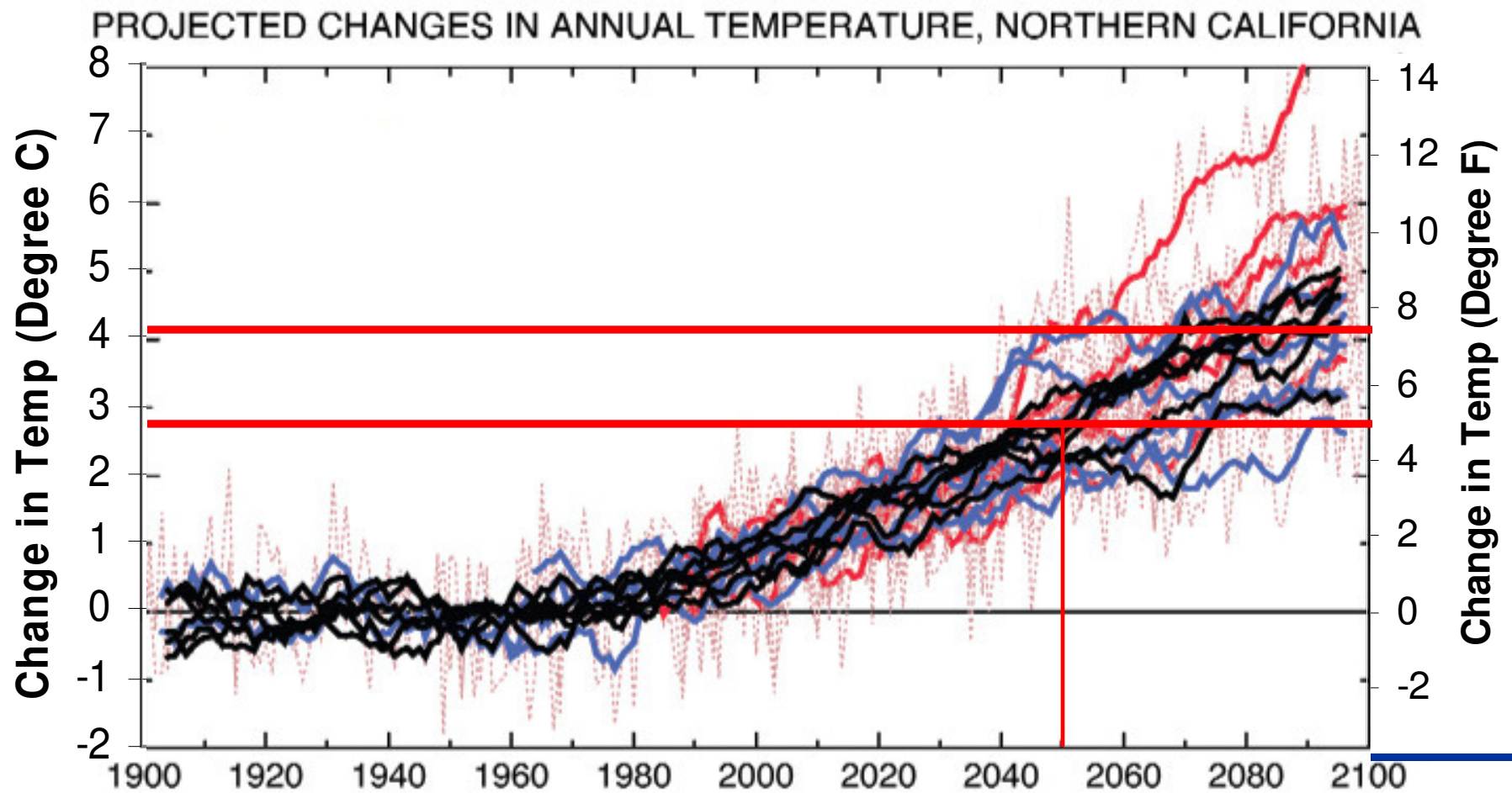


Year 2000 data. Does not include re-use. Quantities vary by year.

Profound Climate Change Impacts



Temperature Change in California



We Expect Many Water Resource Consequences



- Flood Management
- Water Supplies
- Water Quality
- Water Demands
- System Operations
- Ecosystems



How Climate Change Impacts California's Water Resources



- *Reduced snowpack* impacting water supply and hydropower
- *Earlier snowmelt* increasing flood control portion of reservoir space
- *Higher water temperatures* degrading aquatic ecosystems
- *Rising sea level* threatening the Delta, bays, estuaries & coastline
 - destabilizing levees
 - increasing SW/GW salinity
- *Higher water demand* all sectors

Mount Shasta August 2008

Driest in over 80 years



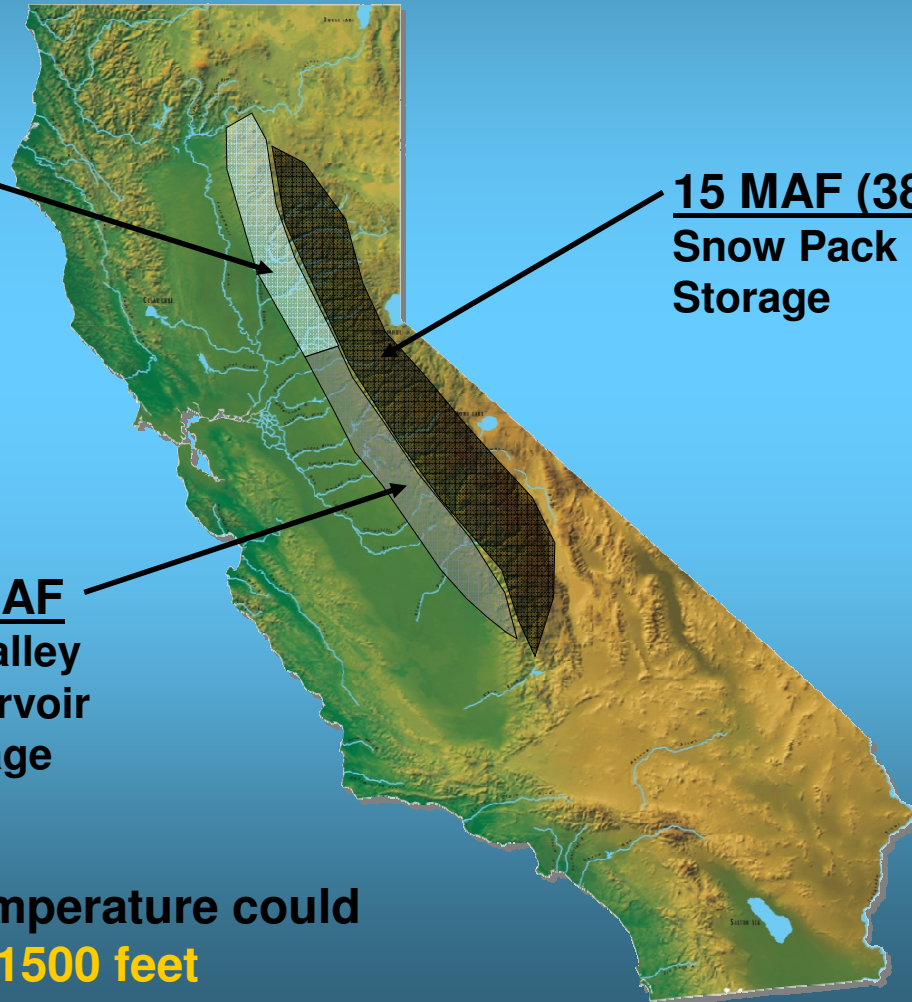
Expected Storage Capacity Change from Increasing Temperature

13.5 MAF
Sac Valley
Reservoir
Storage

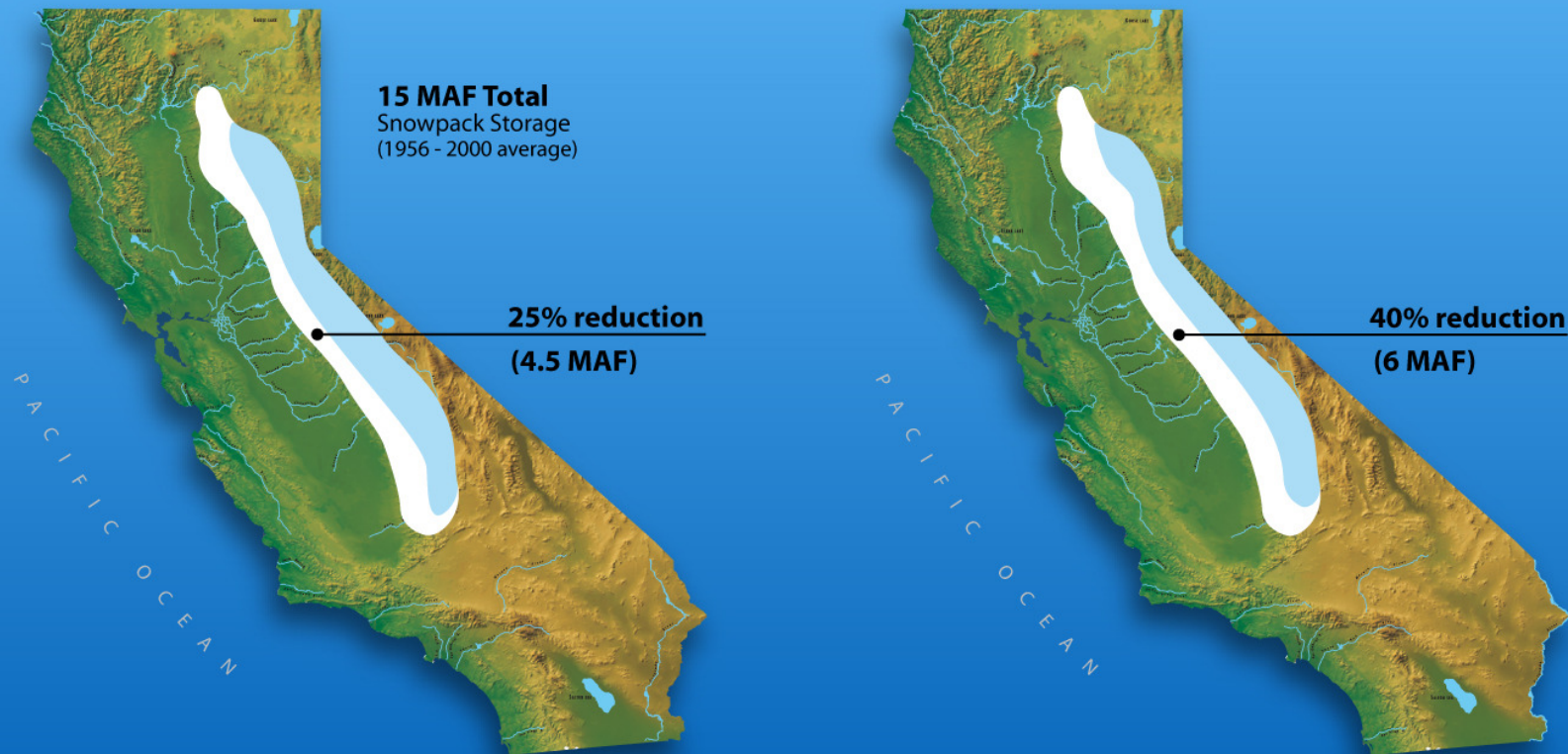
15 MAF (38%)
Snow Pack
Storage

11 MAF
SJ Valley
Reservoir
Storage

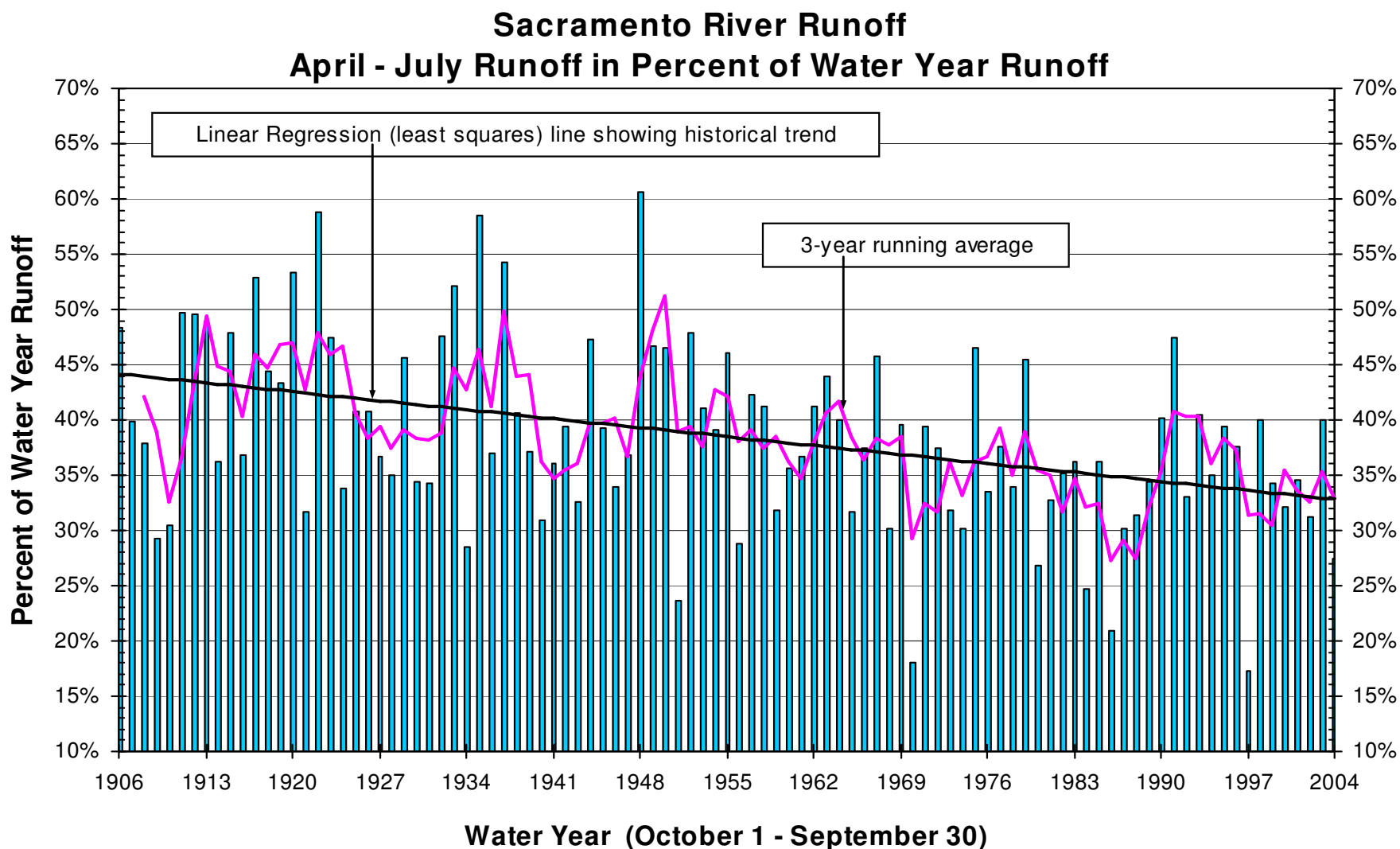
A moderate 3°C *increase* in temperature could
increase snow elevation by 1500 feet
decrease Sierra snow pack by 4 - 5 MAF



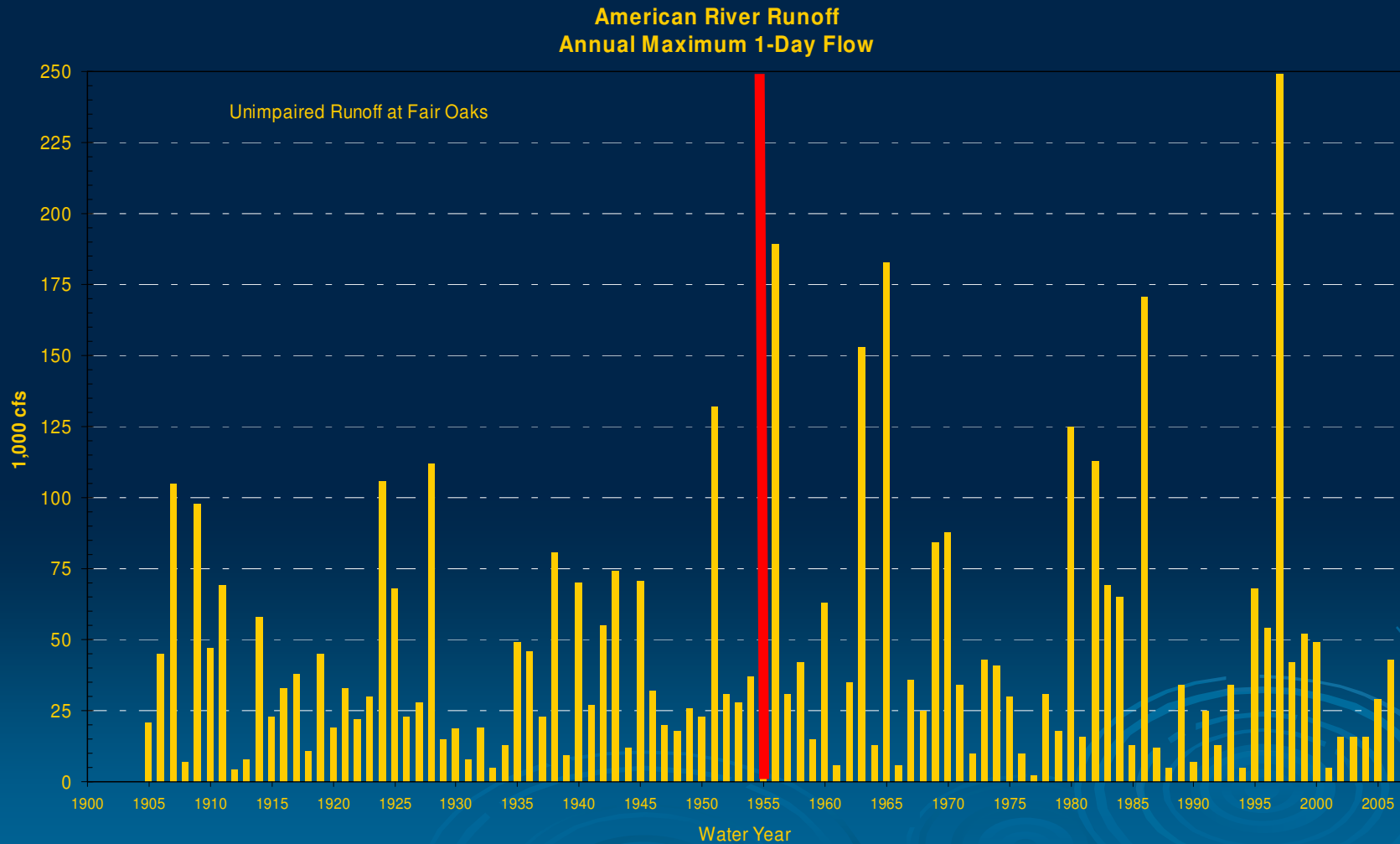
Range of Snowpack Reductions Projected by 2050



Changes in Runoff Timing Attributed to Earlier Snowmelt



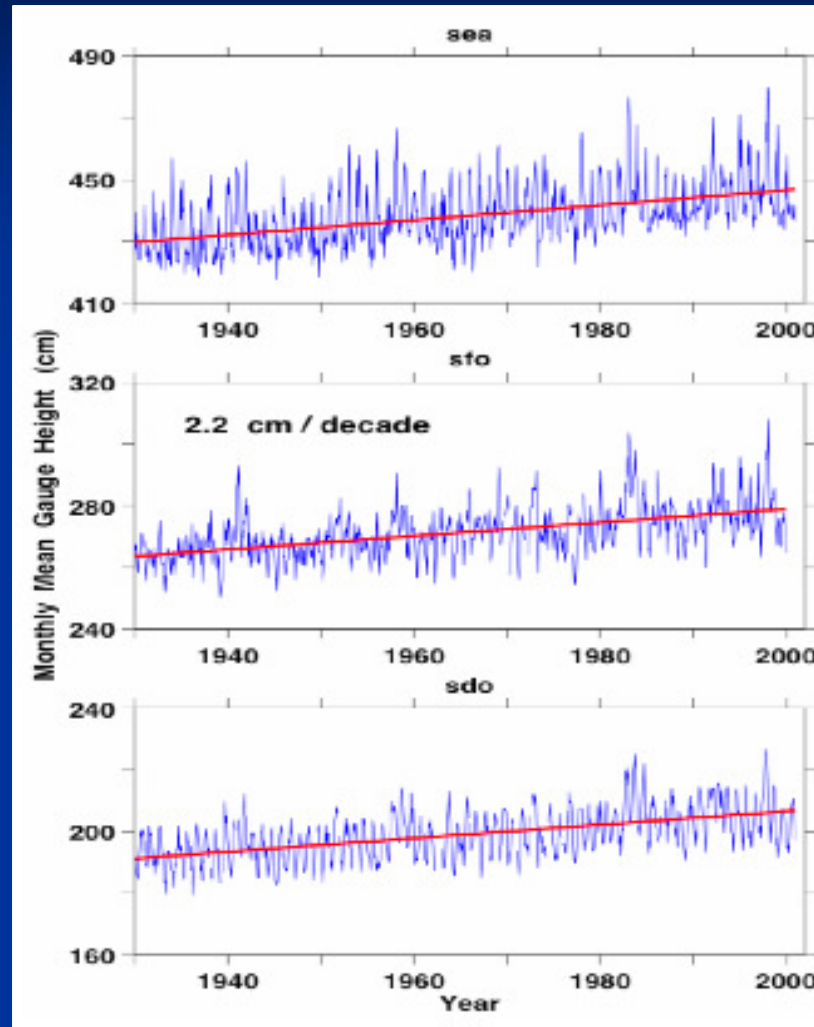
Changes in Peak River Flows American River



Red Line = Construction of Folsom Dam

7" Sea Level Rise Since 1930

Sea Level
Projected
12-24" higher
by 2100



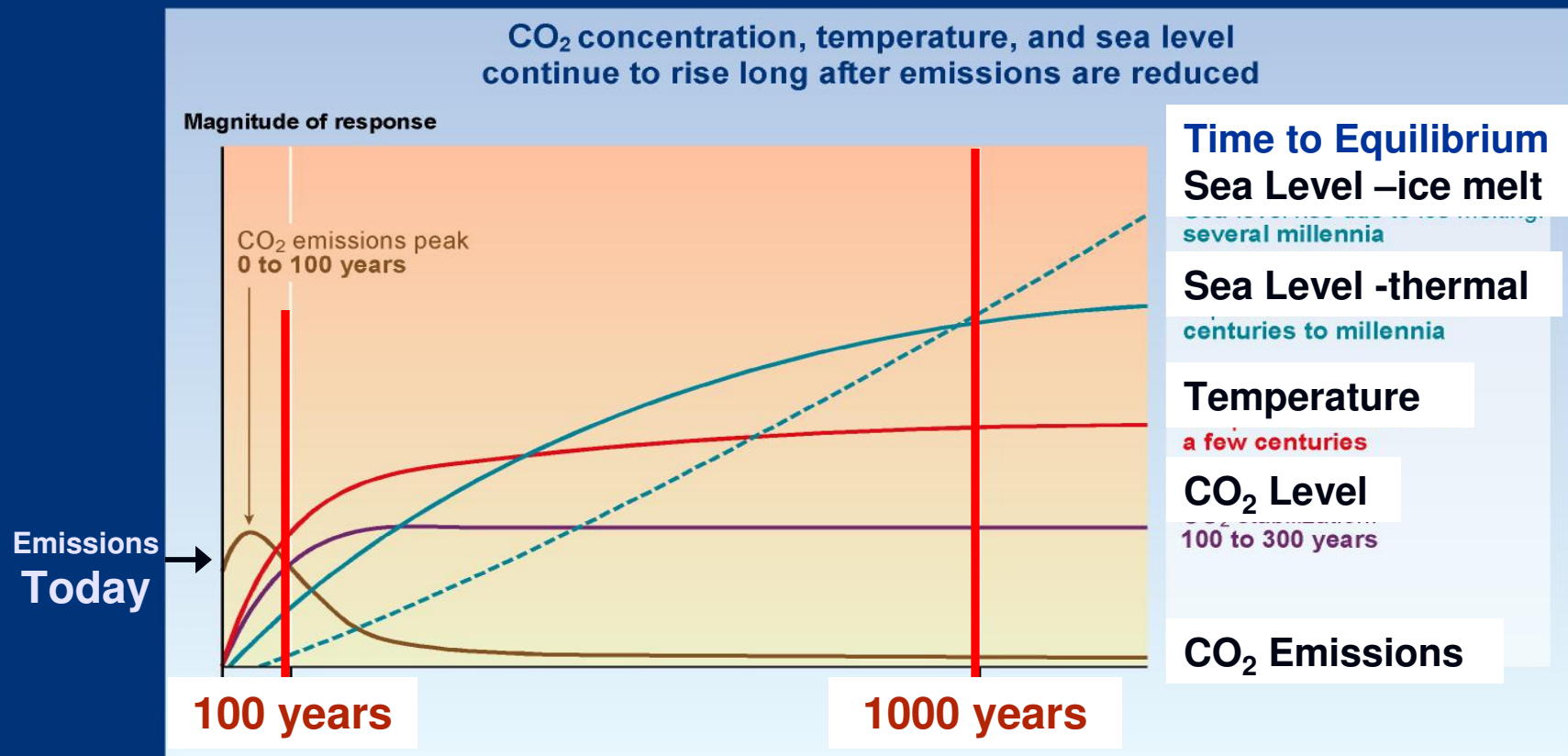
Seattle

San Francisco

San Diego

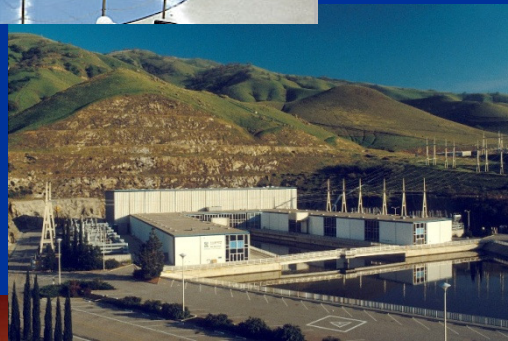
Source: Cayan et al. (2006) *Projecting Future Sea Level*

We Must Adapt to Climate Impacts A Long Time After Emissions are Reduced



SYR - FIGURE 5-2

Water, Energy & Climate Change



Future water management activities must carefully consider strategies to reduce greenhouse gas emissions

California's Drought

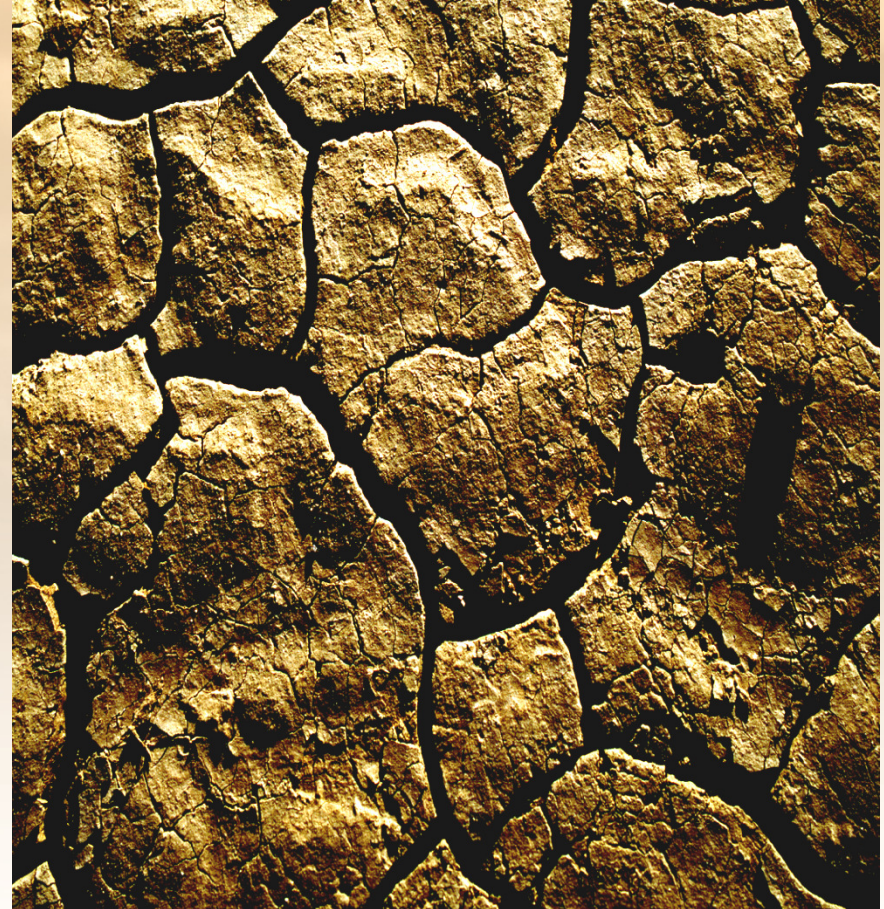
- 2008 second dry year statewide
- Reservoirs critically low
- Groundwater basins drawn down
- State & federal water projects restricted by regulatory actions to protect the Delta
- Drought conditions continue in 2009



Folsom Lake

2008 Water Conditions

- 2008 driest recorded spring/summer period
 - **3.4 inches of rainfall**
 - **24% of average**
- 2007 Southern CA driest recorded year
- Sac. & San Joaquin Rivers – 2 year runoff lowest 10% of historic



Current Water Conditions

As of mid-February 2009

- **Dry first half winter 2009**
 - **Precipitation & snowpack critical**
- **Northern Sierra precipitation 76% of average**
- **Sierra snowpack 74% of average**



Lake Oroville

Current Reservoir Conditions



- **Shasta @ 35% of capacity**
- **Folsom @ 31%**
- **San Luis @ 38%**
- **Oroville @ 31%**



- **Oroville lowest carryover storage since 1977**
- **Lowest Jan 1 storage level ever**

2-Year Drought Fire Impacts

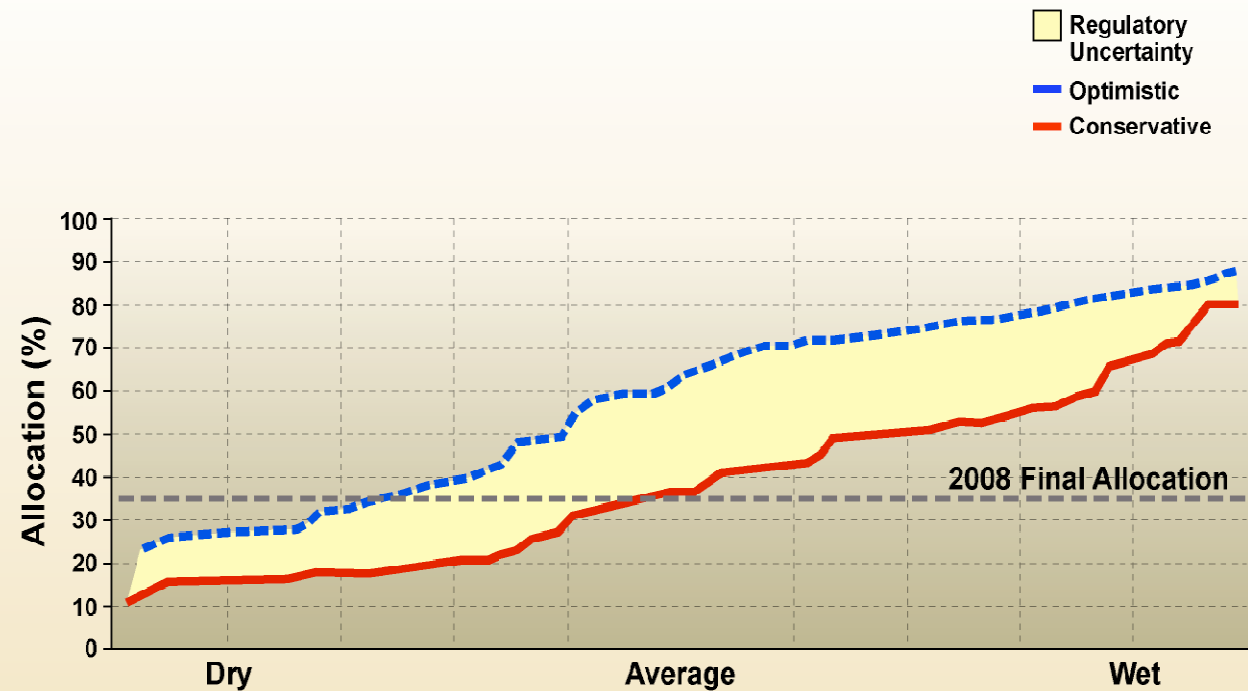


- More than **16,000** fires
- Over **1.6M** acres burned
- **13** people lost their lives
- Over **4000** structures destroyed
- Nearly **\$1B** for State firefighting
- Rainfall puts burn areas at risk

Estimated 2009 Water Supply Reductions

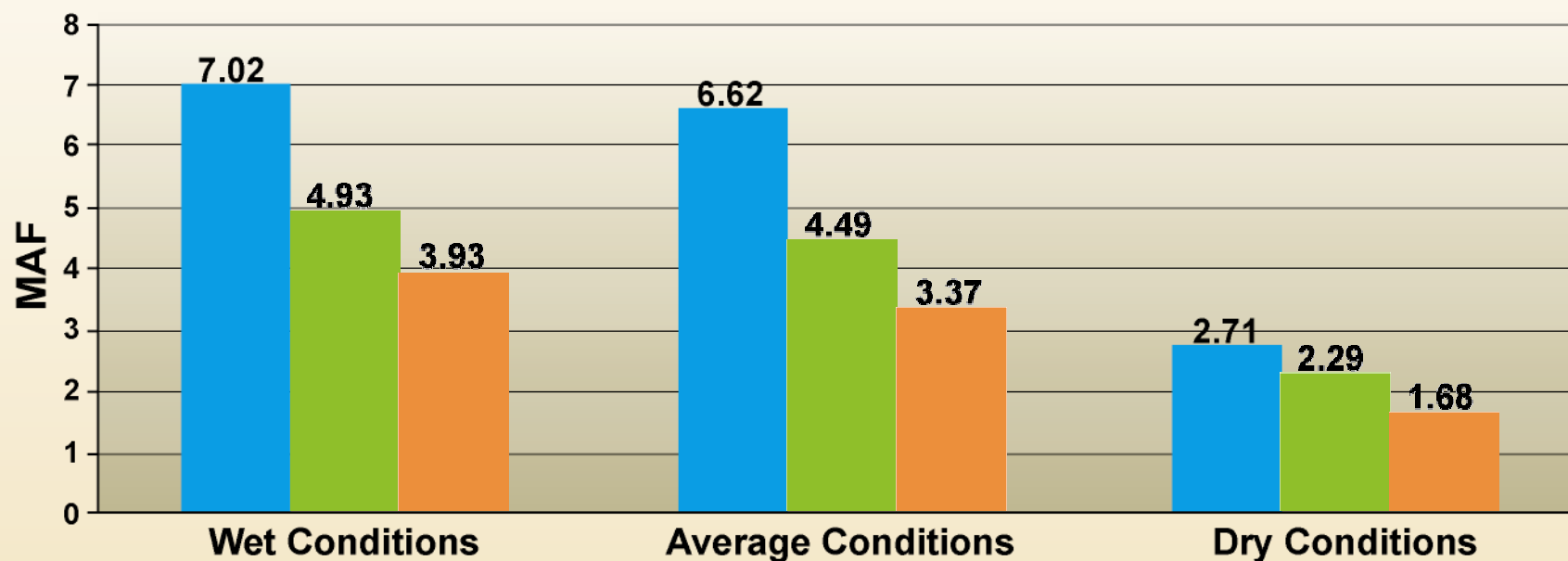


- Additional SWP delivery reduction due to Delta Pumping Restrictions
- 2009 State Water Project Initial Allocation @ 15%



Forecasted 2009 SWP/CVP Delivery Capability

D-1641
Delta Smelt
Longfin Protection



Drought Response

- **Conservation**
- **Drought water bank**
- **Regional transfers**
- **Expedited grants**
- **Workshops/public outreach**



Long Term Actions

- Increase & sustain conservation
- Diversify regional supplies
- Increase storage
- Fix the Delta
- Sustain investment

That is:

Implement the
California Water Plan
Update 2009



Questions?

